



## Balance Function Disorders

*Weightlessness  
investigations  
prove useful  
in balance  
research*

Balance disorders affect more than two million Americans annually. In some 20 percent of these cases, the problem is caused by inner ear disease. The balance disorder may manifest itself as vertigo, whirling or dizziness, and it may lead to personal injury, misery and time lost from work and family.

At the Minneapolis (Minnesota) Neuroscience Institute on the Abbott Northwestern Hospital campus, the Balance Function Laboratory and Clinic is a collaborative project of community physicians and LifeSpan hospitals offering diagnosis and treatment of patients with balance function disorders. At the laboratory, physicians and researchers are employing NASA technology originally developed to investigate vestibular (inner ear) function in weightlessness.



One of the sophisticated tools used in the Balance Function Laboratory is a rotational chair (**left**) technically known as a "sinusoidal harmonic acceleration system." Manufactured by ICS Medical Corporation, Schaumburg, Illinois, the chair system turns a patient and monitors his or her responses to the rotational stimulation. The body's balance is maintained by visual, touch and vestibular information integrated within the brain. The vestibular information is the body's internal monitoring system; vision and touch are environmental monitors.

"The chair technology is invaluable for assessing balance function problems," says Dr. Gene Balzer, audiologist and clinical researcher. "It is particularly helpful in my research with deaf and blind individuals who lack vestibular function, a group that could not adequately be evaluated with previous testing technology. Chair testing can also be used to evaluate children under age two, something that was difficult with other tests."

The chair system is also used by clinical neuro-otologist Dr. Rick L. Nissen to diagnose patients with Meniere's disease (abnormal fluid buildup in the inner ear) and by clinical neurologist Dr. Richard V. Johnson in diagnosis of older patients with unknown loss of vestibular function, also patients with a breakdown in the integration of this information in the central nervous system.

The staff and physicians of Minneapolis Neuroscience Institute have used the chair technology to monitor recovery of balance function following acoustic/vestibular nerve tumor removal. Their research has demonstrated central nervous system adaptation to changes in vestibular information. It has also provided information on treatment to overcome post-operative dizziness.